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News Release

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Argonne's Barry Smith and Lois Curfman McInnes Win E.O. Lawrence Award

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Argonne National Laboratory researchers Barry Smith and Lois Curfman McInnes have been named winners of the U.S. Department of Energy's Ernest Orlando Lawrence Award, which honors midcareer scientists and engineers for exceptional contributions in research and development.

"These researchers have made significant contributions to the national, economic and energy security of the United States," Secretary Steven Chu said in announcing the awards. "I congratulate the winners and thank them for their work on behalf of the Department and the Nation."

The award citation honors the breakthrough work of Smith and McInnes in developing PETSc, the Portable, Extensible Toolkit for Scientific computation. PETSc provides robust, scalable software for solving partial differential equations. Since such equations are ubiquitous in computational models in science and engineering, the PETSc library has had a major impact in a wide variety of critical application areas, including acoustics, arterial flow, air pollution, combustion, computational fluid dynamics, earthquake simulation, electromagnetics, fusion, ice dynamics, nanomaterials, and parallel reservoir simulation.

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"PETSc continues Argonne's proud tradition of developing high-quality, influential numerical libraries," said Rick Stevens, associate laboratory director of Argonne's Computing, Environment, and Life Sciences directorate. "With PETSc, Smith and McInnes have put the power of parallel computing in the hands of a wide range of scientists. I anticipate that PETSc will be a valuable tool for emerging exascale computing environments."

Smith, a senior computational mathematician in Argonne's Mathematics and Computer Science (MCS) Division, received his Ph.D. in 1990 in mathematics from the Courant Institute of Mathematical Science (New York University). He was a Wilkinson Postdoctoral Fellow at Argonne and joined the laboratory in 1994. McInnes, a computational scientist in the MCS Division, received her Ph.D. in applied mathematics in 1993 from the University of Virginia. She was a DOE Distinguished Postdoctoral Fellow at Argonne and joined the laboratory in 1997.

In developing PETSc, Smith and McInnes analyzed the challenges facing a broad variety of high-performance applications and then devised strategies to encapsulate advances in applied mathematics in robust, portable, extensible software.

"This award would not have been possible without the help and contributions of numerous collaborators over the years," said Smith and McInnes. "The community support has been essential in driving and transforming how large-scale software libraries are developed, maintained, and used."

"We are incredibly honored that PETSc has been recognized for this award," they added.

Smith and McInnes also both credit the importance of Argonne's postdoctoral programs and the opportunity to shape their own research program.

PETSc was the first widely used parallel, object-oriented numerical software library developed at DOE national laboratories. One of the contributing factors to its success was its ability to manage

the complexity that had overwhelmed previous attempts at developing general-purpose iterative solver libraries. PETSc was unique at the time of its introduction in that it placed object-oriented concepts in a context understood by scientific programmers, allowing researchers to continue to program in their favorite languages, using their well-established paradigms.

Today, numerous other software packages, written by groups throughout the world, rely on the transformational solver infrastructure in PETSc for portable performance on machines ranging from laptops to networks of workstations to petascale simulations and beyond.

The Lawrence Awards are DOE's highest honors and include a gold medal, a citation, and $20,000, which will be presented at a ceremony in Washington, D.C., early in 2012. The awards were established by President Dwight Eisenhower in 1959, soon after the death of Ernest Lawrence, to honor the Nobel Prize-winning inventor of the cyclotron, the forerunner of today's particle accelerator.

Smith and McInnes's work on PETSc has also received several previous honors. For example, PETSc was cited as one of the "Top 10 Computational Science Accomplishments of DOE" in 2008. It also won an R&D award in 2009 for its use in simulations by government agencies as well as industry.

By Eleanor Taylor

For more information on the Lawrence Awards, see http://science.energy.gov/lawrence

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